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United States Department of Agriculture.

SECTION OF VEGETABLE PATHOLOGY.

CIRCULAR No. 7.

GRAPE VINE DISEASES.

SIR:

With the view of obtaining a more definite knowledge as regards the distribution, habits etc., of several of the most destructive fungous diseases of the vine, the following circular has been prepared and is herewith submitted.

Respectfully,

B. T. GALLOWAY,

HON. J. M. RUSK,

Chief of the Section.

Secretary.

(I.)—DOWNY MILDEW, BROWN AND GREY-ROT.

These diseases are caused by a fungus known as *Peronospora viticola*. When the *Peronospora* attacks the leaves the disease is known as the downy mildew ; when it attacks the berries and destroys the pulp without forming external reproductive bodies it is brown-rot ; when it occurs on the young fruit and covers the berries with its greyish conidia or "seed" grey-rot is the term applied to it.

Leaves affected with downy mildew show, upon the upper surface, greenish yellow or brownish spots of irregular size and shape, while opposite these discolorations, on the lower side, a downy whitish frost-like growth may be seen. In advanced stages of the disease, or after a heavy rain, the frost-like patches often disappear leaving in their place light brown discolorations corresponding in size and shape with those on the upper side.



Brown-rot usually appears when the fruit is nearly full grown and as already stated, there is no external evidence of the presence of a fungus. Purplish brown discolorations appear as a first manifestation of this form of rot. Soon the entire berry turns brown, the pulp becomes soft and often shrinks, forming depressions over which the wrinkled yet otherwise smooth and unbroken skin is stretched.

In the case of grey-rot the berries and often the pedicel are covered with a frost-like growth similar to that which occurs on the leaves. In fact the characters of this disease are so well marked that a further description is useless as it can not well be mistaken for anything else.

(II.)—THE POWDERY MILDEW.

This mildew usually makes its appearance toward the middle of summer and continues until frost. It attacks the leaves, young shoots and fruit, covering them with a powdery meal-like growth altogether different from the downy mildew. It also differs from the latter in that it occurs abundantly on the *upper* surface of the leaves where it forms mealy white patches of various sizes and shapes. Occasionally it is spread out quite evenly over the entire surface, resembling in some respects the delicate web of a spider. Fruit affected with the powdery mildew shows on the surface a coating of whitish meal-like dust; this rapidly increases in thickness and soon the berries shrivel, the skin cracks admitting other agents of decay which soon finish the work of destruction.

(III.)—ANTHRACNOSE.

Like the downy mildew and black-rot, anthracnose attacks the leaves, growing shoots and berries.

Leaves, when first affected with the disease, show minute blackish brown spots, which are surrounded with a slightly raised darker colored margin. Ultimately the center of the spots turn grey and not infrequently the diseased parts separate from the surrounding healthy portions leaving the leaf full of small ragged edged holes. On the shoots the disease manifests itself in much the same way as it does on the leaves. As it progresses, however, the spots usually retain their dark color and often run together forming more or less elongated diseased areas which gradually eat their way into the wood. The scars made in this way may often be seen on the ripened wood and it is now known that the mycelium or body of the fungus passes the winter in the tissues surrounding these places.

Anthracnose on the fruit, or birds-eye rot as it is sometimes called, first appears as a black or brownish circular spot surrounded by a narrow somewhat darker rim. As the spots increase in size the color under-

goes various changes. In some cases the outside rim remains dark brown while inside of this is a wider zone of a beautiful vermillion color surrounding a greyish white center. Frequently the spots when less than one-eighth of an inch in diameter assume a greyish white color which they retain throughout the rest of their growth. When the berries are small the disease often manifests itself in another way. The fruit turns brown, shriveles up, and at the same time little pinkish pustules appear on the surface.

This form of rot is not characterized by a softening of the tissues as is the case with others we have mentioned. The tissues slowly collapse but at the same time become hard and leathery.

(iv.)—BLACK-ROT.

This disease is confined for the most part to the leaves and fruit. Upon the former it usually appears about ten days before the fruit is attacked and manifests itself in the form of reddish brown more or less circular spots. As the disease progresses the spots run together forming large irregular shaped blotches, at the same time there appear, scattered over the surface, numerous minute black specks.

The berries when first attacked by the fungus of black-rot show at one or more points upon their surface small brownish more or less circular discolorations. These rapidly enlarge and soon the rest of the berry turns brown while the part first attacked assumes a blackish hue. Minute pimples now appear scattered irregularly over the surface and finally the berry withers, turns black and ultimately dries up, but as a rule remains firmly attached to the stalk.

(v.)—BITTER-ROT.

This fungus attacks the shoots, also the berries and their supporting stalks and derives its name from the flavor it imparts to the fruit. Its greatest injury is to the berries which it, as a rule, attacks about the time they attain full size. At first a brownish circular spot appears on the berry ; this rapidly enlarges and soon the entire berry turns brown but still retains its usual shape. Finally little purplish black pimples appear thickly dotting the surface and soon the berry shrivels and falls to the ground. It will be seen that an important difference between this disease and black-rot is that in the case of the latter the berries turn black and as a rule remain firmly attached to the vine while with the former the fruit remains brown or purplish brown and readily falls at the least disturbance. Bitter-rot may also be distinguished from brown-rot by the little pustules which cover the surface. It will be remembered that in the case of brown-rot the surface of the berry, excepting the wrinkles, remain smooth.

(VI.)—WHITE-ROT.

The fungus causing this disease attacks the fruit, the pedicels or stalks which support the latter and rarely the branches.

When it attacks the pedicels the latter turn brown and soon the berries which they support dry up and appear as if scorched. Berries affected with the disease first become very juicy and soon minute grey or brownish postules appear on the surface. Finally the berry dries up assuming at the same time a greyish white color, easily distinguished from that produced by the black-rot fungus.